

■ ■ ■ Smiths Power Professional Services

■ ■ Specialists in Grounding, Power Distribution,
Lightning & Surge Protection

Comprehensive Grounding and Protection of Communication Sites One-Day Training Seminar

Course Summary

A high-integrity grounding system is the single most effective means of assuring quality power distribution with a minimum risk exposure to transient spikes, noise, and lightning. This one-day course describes how all of the key elements of a communications site grounding and protection system function with emphasis on single point grounding techniques.

Who Should Attend

This course is designed for the communications professional whose job responsibilities include working with AC and DC systems powering critical equipment.

A prerequisite for attendance is a basic understanding of electrical theory and Ohm's law.

What to Expect

The class meets from 8 am to 5 pm. Each student will receive a course manual that includes the figures, tables and graphs discussed during the presentation.

Additional Training

Upon request, a second day of hands-on Site Inspection Training may be added at a discount following this course. Site Inspection Training takes place at a client facility, where students will learn the principles and techniques to identify deficiencies in a site's electrical, grounding, and protection systems including visual inspection and using various field measurement instruments.

Accredited for 0.8 Continuing Education Units. BICSI Certified.

Course Outline

Section 1: Basics of Grounding

- Purpose of Grounding
 - Basic Grounding of AC & DC circuits
 - Resistance and Impedance of Grounding Conductors
 - Allowable Ground Current
 - Purpose of Bonding
-

■ ■ ■ Smiths Power Professional Services

■ ■ Specialists in Grounding, Power Distribution,
Lightning & Surge Protection

- Ground Loops

Section 2: Grounding Electrode System

- Earth Grounding
- Conductivity of Earth
- The Grounding Electrode
- The Ground Ring
- Ground Radials
- Concrete-Encased- Electrode
- Grounding Electrode System
- Sizing the Grounding Electrode Conductor
- Bending and Bonding of Grounding Electrode Conductor
- Compression and Exothermic Bonding
- Earth Ground Resistivity
- Earth Ground Resistivity Nomograph
- Earth Ground Resistance Testing
- Ground Continuity Measurement

Section 3: Site Grounding

- AC Service Grounding
- Telephone Service Grounding
- Tower Grounding
- Tower Guy Wires Grounding
- Transmission System Grounding and Bonding
- Ice Bridge/Cable Tray System Grounding and Bonding
- Equipment Grounding
- Fence Grounding
- Emergency Back Up System Grounding
- Grounding of Surge Protection Devices
- Grounding of Lightning Protection System
- Shelter and Building Grounding
- Grounding of Rooftop Mounted Structures
- Cellular Site Grounding

Section 4: Equipment and Enclosure Grounding

- Equipment Ground Conductor for AC Circuits
 - Equipment Ground Conductor for DC Circuits
 - Isolated Ground Systems
 - Equipment Ground Conductor Bending
 - Ancillary Equipment Grounding and Bonding
 - Equipment Required to be Bonded
 - Equipment Rack Grounding and Bonding
-

■ ■ ■ Smiths Power Professional Services

■ ■ Specialists in Grounding, Power Distribution,
Lightning & Surge Protection

- Cable Tray System Grounding and Bonding
- Battery Racks Grounding and Bonding
- ESD Grounding
- Halo Ground
- Transmission Lines Protection and Grounding at Entry Points
- Grounding of Surge Protection Devices

Section 5: DC Grounding Practices

- Single Point Grounding Techniques of DC Equipment.
- Master Ground Bar (MGB)
- Frame/Logic Ground Bar
- Equipment Ground Bar
- Isolated Ground Bar
- Ancillary Ground Bar
- DC System Grounding
- Bonding to the MGB
- Location of the MGB
- Grounding of the MGB
- Typical Grounding of a Telecommunication Site

Section 6: Grounding of Signal Carrying Cables

- Low Frequency Shield Grounding for Multipair Data Cables
- Multiple Grounding of Shielded Multipair Cables
- High Frequency Shield Grounding for Multipair Data Cables
- RS 232 Pin Assignment Table
- Grounding for RS 232 Cables
- Low Frequency Shield Grounding for Coax Cables
- High Frequency Shield Grounding for Coax Cables
- Cable Grounding for Multiple Buildings
- Optical Fiber Cable Shield Grounding

Section 7: Surge Protection Devices (SPD)

- Sources of Transient Overvoltages
 - Gas Tube Technology
 - Metal Oxide Varistor Technology
 - Silicon Avalanche Diode Technology
 - Normal Mode Protection
 - Common Mode Protection
 - Primary Protection Methods
 - Secondary Protection Methods
 - AC Service SPD
 - Telephone Service SPD
-

■ ■ ■ Smiths Power Professional Services

■ ■ Specialists in Grounding, Power Distribution,
Lightning & Surge Protection

- Data Line SPD
- Transmission Lines SPD
- Tower Lighting SPD
- Typical SPD Protection for a Telecommunication Site

About Smiths Power Professional Services

Smiths Power is a leading supplier of power distribution, conditioning, protection and monitoring solutions for data centers, wireless communications and other mission-critical or high-value electrical systems. Through the Professional Services arm, Smiths Power helps organizations with:

- **Site Audits** – Grounding, Power, Surge Protection, and Physical Lightning Protection systems. Comprehensive inspections to industry standards and engineering best practices.
- **Consulting** – Design review and expert consultation on grounding, power distribution, and protection systems.
- **Training** – Accredited classroom and hands-on training in a range of topics related to our area of expertise: grounding, power, and protection. We offer courses open to the public and **in-house training for private groups upon request**

As a family of brands, PDI, ONYX, PolyPhaser, Transtector, LEA, and RO Associates unite under one umbrella to Transform, Distribute, Monitor and Protect™ power in global networks and systems. The Smiths Power companies provide expertise in consulting, design and manufacturing of power transformers and distribution systems, static switching, power monitoring, RF, AC, DC, data signal and EMP protectors, as well as power quality engineering services. For more information, visit www.smithspower.com.